



Materials Engineering Branch

TIP*



No. 009 Teflon Insulated Wiring

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The cold-flow properties of Teflon are well known to most spacecraft developers. As every new flight program takes shape, designers and experimenters are reminded about Teflon cold-flow. And yet, there are still incidents of electrical shorting caused by the improper use of Teflon insulated wiring. One of the most publicized examples of a cold-flow event is the one where Teflon insulated wire comes in direct contact with a metal component, such as the edge of a chassis feed through hole, where some stress is involved. As the Teflon insulation cold-flows away from the contact zone due to the pressure involved, the insulation becomes sufficiently thin with time to cause metal-to-metal contact thus resulting in a short.

In a less familiar case, an electrical short due to Teflon cold-flow has been observed in a bundle of Teflon coated wires wrapped with a lacing cord or cable ties. It is believed that the force exerted by the lacing cord, tying the bundle together, was sufficient to cause Teflon cold-flow such that the wires made contact or that a foreign metallic particle was trapped within the bundle. In any event, it appears that in spite of all of the warnings that go out to spacecraft developers, the threat of electrical failure caused by the cold-flow behavior of Teflon still exists. More effort needs to be made to insure that the technicians who assemble the hardware are better instructed in the use of Teflon.

Also, there is Tefzel and Kynar insulated wire that have excellent outgassing properties and whose resistance to cold-flow and the space radiation environment are much better than that of Teflon.